

# Abstract

**THESIS PAPER:** Zero-inflated regression models for count data: an application to under-5 deaths

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Zero-inflated (ZI) count data models overcome the restriction of equality relationship between mean and variance, but functional relationship still exists. For ZI models it is important to know whether the proportion of zeros and the rate of counts have any influence on the fit of the model. In this study we have considered three zero-inflated models, namely, ZIP, ZINB, and Hurdle model. We also considered Poisson and negative binomial model as classical count data models. Our simulation experiment suggests that the proportion of zeros for given rate parameter does not affect the fit of the models as long as model is correctly specified. In case of misspecification of the model, it does not perform well for large rate parameter. These three zero-inflated models performed better than the classical models as the rate parameter and the proportion of zeros become larger. We applied five models to the BDHS 2011 survey data to understand the social determinants associated with a mother to experience under-5 deaths of her children. The classical models failed to differentiate between mothers who have experienced under-5 deaths of their children and who have never experienced under-5 deaths. While zero-inflated models were able to differentiate between those two groups of mothers in terms of zero counts and positive counts of number of under-5 deaths of their children with associated covariates in opposite slope of coefficients. Among the three zero-inflated models, Hurdle model performed best in fitting the data compared to the ZIP and ZINB models.